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Boston College, August 1997

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**International Conference
on Strongly Coupled Coulomb Systems**

Conference Program

Boston College 1997

Sunday, August 3

Welcome Reception 7:00 - 9:00

Monday, August 4

Opening 9:00 G. J. Kalman

Michael Smyer Welcoming Address
Associate Vice President for Research and Dean, Graduate School of Arts and Sciences, Boston College

Marie Mc Hugh Welcoming Address
Senior Associate Dean, College of Arts and Sciences, Boston College

Session 1A 9:15 I. L. Iosilevski

IONIC LIQUIDS

| | | |
|-----------------------|------------|--|
| N. March | 40' | Liquid metals: Electronic correlations |
| E. Burkel | 20' | Dynamical structure factor of liquid metals measured by inelastic X-ray spectroscopy |
| M.-L. Saboungi | 20' | Structure and transport in molten salts and liquid semiconductors |

Session 1B 11:00 W.-D. Kraeft

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|-------------------------|------------|---|
| J. Chihara | 20' | Change from liquid metal to plasma (Chihara, Kahl) |
| I. L. Iosilevski | 15' | Anomalous phase diagram in simplest plasma model (Gryaznov, Iosilevski, Yakubov) |
| E. Marceca | 20' | Thermodynamic properties and local structure of He-Hg mixtures from near-critical conditions to high temperature and pressure (Marceca, Hensel) |
| W.-C. Pilgrim | 15' | The monoatomic-molecular transition in expanded alkali metals (Pilgrim, Ross, Yang, Hensel) |
| V. Kozhevnikov | 15' | Phase transition in sub and super critical mercury fluid |
| I. L. Iosilevski | Poster | Ionic model for liquid uranium dioxide (Iosilevski, Chigvintsev) |
| V. Ya. Ternovoi | Poster | Investigation of tin thermodynamics in near critical point region (Ternovoi, Filimonov, Fortov, Lomonosov, Nikolaev, Pyalling) |

Session 1C 2:00 H. Gould

MULTICOMPONENT AND ASTROPHYSICAL PLASMAS

| | | |
|--------------------|---------------|--|
| H. DeWitt | 40' | Equation of state and phase diagram for binary ionic plasma (DeWitt, Slattery) |
| H. S. Kang | 20' | Thermodynamic and structural properties of strongly coupled plasma mixtures from the perturbative HNC-equation (Kang, Ree) |
| A. Mirone | 15' | Statistical mechanics of highly charged ions in NLTE plasmas (Faussurier, Mirone, Gilleron, Gauthier) |
| T. Kahlbaum | Poster | Advances in the calculation of the free energy virial expansion for multi-component quantum plasmas up to the third order in the density |

Session 1D 4:00 Y. Rosenfeld

DUSTY PLASMAS I

| | | |
|---------------------|------------|--|
| V. E. Fortov | 40' | Phase Transition in Dusty Plasmas Experiments (Fortov, Nefedov, Torchinski, Molotkov, Khrapak, Petrov) |
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WHITE DWARFS

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|----------------------------|---------------|---|
| J. Isern | 20' | Crystallizing white dwarfs |
| D. G. Yakovlev | 20' | Cooling of neutron stars as a probe of strongly coupled coulomb plasma in their envelopes (Yakovlev, Chabrier, Potekhin) |
| G. Shaviv | 15' | The screening of nuclear reactions in astrophysical plasmas (Shaviv, Shaviv) |
| V. Rantsev-Kartinov | Poster | Effect of dynamical screening of charged particles in Maxwellian plasmas on the criterion of plasma non-ideality (Krainov, Rantsev-Kartinov, Trofimovich) |
| D. K. Geller | Poster | Coulomb collisions in strong magnetic fields (Geller, Weisheit) |
| W. Stolzmann | Poster | The effects of exchange and correlation for astrophysical relevant quantities (Stolzmann, Blöcker) |

Session 1E 8:00 R. K. Pathak

POSTER SESSION

see the separate poster directory distributed on Monday

Tuesday, August 5

Session 2A 9:00 G. Senatore

DENSITY FUNCTIONAL THEORY

| | | |
|---------------------------|---------------|---|
| W. Kohn | 40' | Density functional theory in 1997 |
| Ch. Dharma-wardana | 20' | Density functional calculations for (I) K-shell absorption edge and (II) energy-relaxation in dense plasmas |
| O. G. Heinonen | 20' | Ensemble density functional approach to inhomogeneous quantum hall systems |
| R. Martin | 20' | Linear scaling methods in density functional theory |
| J. Perdew | 20' | Local and semilocal density functional approximations: Why do they work? |
| D. C. Wang | Poster | Density functional theory of freezing: application of the weighted density approximation (Wang, Gast) |
| G. Faussurier | Poster | Average-atom model and density functional theory using functional integrals |

Session 2B 11:30 H. Totsuji

EQUATION OF STATE

| | | |
|---------------------|------------|--|
| F. J. Rogers | 40' | Equation of state of partially ionized plasmas |
| A. Likalter | 20' | Disordered systems with a virtual atomic structure |
| Y. Rosenfeld | 20' | Dimensional cross-over, close-packed configurations, symmetry-breaking, and the freezing transition in density functional theory |

Session 2C 2:00 D. Kremp

| | | |
|------------------------|------------|---|
| A. DeSilva | 20' | Measurements of electrical conductivity in strongly coupled metal plasmas (DeSilva, Katsouros) |
| J. Benage | 15' | Measuring the EOS of a dense, strongly coupled plasma; description of the technique and preliminary results (Benage, Kyrala, Workman, Tierney IV) |
| K. J. LaGattuta | 15' | New computational technique simulates atomic scale phenomena in dense materials |
| W. Däppen | 20' | The sun – strong constraints on a weakly coupled plasma |

Session 2D 3:40 W. Ebeling

HYDROGEN I

| | | |
|------------------------|------------|--|
| W. J. Nellis | 40' | The metallization of fluid hydrogen |
| W. R. Magro | 20' | RPIMC calculations in hot, dense hydrogen (<i>Magro, Militzer, Ceperley, Pierleoni, Bernu</i>) |
| C. Toepffer | 20' | Wave packet molecular dynamics (WPMD) simulation of hydrogen under extreme conditions |
| F. B. Baimbetov | 15' | Scattering cross sections and conductivity of strongly coupled hydrogen plasma (<i>Nurekenov, Baimbetov, Gabdullina, Redmer, Röpke</i>) |
| B. Militzer | Poster | Fermionic path integral simulations of dense hydrogen (<i>Militzer, Ceperley</i>) |
| T. S. Ramazanov | Poster | Correlation functions and the equation of the state of a strongly coupled hydrogen plasma in HNC approximation (<i>Ramazanov, Baimbetov, Bekenov, Nagel, Redmer, Röpke</i>) |
| F. B. Baimbetov | Poster | Monte Carlo simulation of the equilibrium properties of a strongly coupled hydrogen plasma (<i>Baimbetov, Bekenov, Ramazanov, Itzeleuov</i>) |

Session 2E 8:00 P. P. J. M. Schram

SPECTROSCOPY

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|-----------------------|------------|--|
| R. W. Lee | 40' | Perspectives on plasma spectroscopy in dense plasmas |
| A. V. Demura | 15' | MD radiation redistribution functions of multiply charged ions in dense plasmas (<i>Demura, Bulyshev, Lisitsa, Starostin, Suvorov, Yakunin</i>) |
| D. Gilles | 15' | On plasma statistics of microfield gradients and line asymmetries (<i>Gilles, Demura, Stehle</i>) |
| C. F. Hooper | 15' | Theoretical analysis of x-ray spectra obtained from recent laser-driven implosion experiments (<i>Hooper, Haynes, Junkel, Gunderson, Bradley, Delettrez, Jaanimagi, Woolsey, Lee, Mancini</i>) |
| A. V. Demura | Poster | Radiation redistribution functions of Helium-like, multiply-charged ions in model microfield method (<i>Demura, Feautrier, Kosarev, Lisitsa, Stehle</i>) |
| V. E. Fortov | Poster | Discrete Spectra in Strongly Coupled Plasma (<i>Fortov, Filimonov, Griaznov, Kvitov, Kulish, Mintsev, Nikolaev, Pyalling, Ternovoi</i>) |
| Yu. Kurilenkov | Poster | The correlation effect in spectra of dense hydrogen plasma (<i>Gavrilova, Averyanov, Vitel, Le Guen, D'yachkov, Kurilenkov</i>) |
| D. N. Nikolaev | Poster | Time resolved optical spectroscopy of a lead in the near critical point states (<i>Nikolaev, Filimonov, Fortov, Gryaznov, Kvitov, Pyalling, Ternovoi, Hoffmann, Stöckl, Dornik</i>) |

Wednesday, August 6

Session 3A 9:00 P. Reynolds

ELECTROLYTES, COLLOIDAL SUSPENSION

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|---------------------|------------|--|
| M. E. Fisher | 40' | Density correlations and charge oscillations from the generalized Debye-Hückel theory (Fisher, Lee, Bekiranov) |
| L. Blum | 20' | Scaling in charged fluids: a variational form of the mean spherical approximation |
| H. Iyetomi | 15' | Electronic properties and mechanism of superionic conductivity in solid electrolytes (Iyetomi, Kikuchi, Hasegawa) |
| U. Mohanty | 15' | Polarization of counterions in polyelectrolytes |

Session 3B 11:00 U. Mohanty

| | | |
|---------------------------|---------------|--|
| A. P. Gast | 40' | Crystallization of soft spherical particles: generalities and open questions from colloidal suspensions |
| E. J. Amis | 20' | Polyelectrolyte solutions: structure and dynamics from strong interactions |
| P. P. J. M. Schram | 15' | Theory of colloidal plasmas (Trigger, Schram) |
| M. E. Fisher | Poster | Critique of primitive model electrolyte theories using thermodynamic bounds (Fisher, Lee, Zuckerman) |
| G. A. Pavlov | Poster | Instability of front edge of non-Newtonian polymer suspension film (Pavlov, Baturin, Shiryayev) |

Session 3C 2:00 D. Dubin - Session dedicated to the memory of John. H. Malmberg

CHARGED PARTICLE TRAPS, NON-NEUTRAL PLASMAS

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|----------------|-----|---|
| J. P. Schiffer | 40' | Ordering phenomena in cold Coulombic systems |
| B. Franzke | 20' | Anomalous low temperature of electron cooled ion beams in the ESR |
| R. Grimm | 20' | Laser-cooled ion beams in the storage ring TSR (Grimm, Grieser, Lauer, Luger, Miesner, Peters, Schramm, Schwalm, Stöbel) |
| J. S. Hangst | 20' | Results from the ASTRID storage ring |

Session 3D 4:00 F. Cornu

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|----------------|-----|--|
| P. Huang | 20' | Formation and control of laser-cooled, pure-ion Coulomb crystals in a penning trap (Huang, Bollinger, Tan, Itano, Jelenkovic, Mitchell, Wineland) |
| D. H. E. Dubin | 20' | Collisional transport in non-neutral plasmas (Dubin, O'Neil) |
| K. S. Fine | 20' | 2D vortex crystals (Fine, Cass, Driscoll) |

No Evening Event

Thursday, August 7

Session 4A

9:00

M. Tosi - Session dedicated to the memory of Kundan S. Singwi

ELECTRON LIQUID

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|------------------------|------------|--|
| A. K. Rajagopal | 40' | Electron correlations in coulomb systems in 3 and 2-dimensions: An overview |
| W. Ebeling | 20' | Quasi-classical theory and simulations of quantum plasmas including bound states (Ebeling, Militzer, Schautz) |
| A. Gold | 20' | Screened interaction potential in the three and two-dimensional electron gas: bound states induced by many-body effects (Gold, Ghazali) |
| M. H. Lee | 15' | Static and dynamic properties of an electron gas at $r_s=3.5$ |

Session 4B

11:00

K. Bedell

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|----------------------|---------------|---|
| K. N. Pathak | 20' | Structure and dynamics of two dimensional quantum fluids (Pathak, Moudgil) |
| R. K. Pathak | 20' | Rigorous bounds to coulomb energy functionals |
| Sh. Shapira | 20' | Strongly interacting 2D fermion layer - a quantum to classical crossover experiment |
| M. Tosi | 20' | Two-pair excitations and dynamic exchange-correlation potentials in the electron gas (Conti, Nifosi, Tosi) |
| V. S. Filinov | 15' | Wigner approach and generalization molecular dynamics method in quantum theory of strongly coupled systems of particles |
| M. Steinberg | Poster | Equilibrium properties of weakly coupled magnetized systems (Steinberg, Ortner, Ebeling) |
| I. Tkachenko | Poster | Modeling of the electronic static local field correction (Tkachenko, de Cordoba, Belda) |

Session 4C 2:00 K. N. Pathak

HUBBARD MODEL

| | | |
|------------------------|---------------|---|
| K. Bedell | 40' | The electron gas and the Hubbard model: The long and short of it |
| E. Tsiper | 20' | Quantum melting on a lattice and a delocalization transition (Efros, Tsiper) |
| D. Khveshchenko | 15' | Compressible states of electrons in strong magnetic fields: A genuine example of a 2D non-fermi-liquid |
| K. B. Blagoev | Poster | Metal-insulator transition in ferromagnetic metals (Blagoev, Bedell, Engelbrecht) |

Session 4D 3:40 G. Röpke

QUARK-GLUON PLASMAS

| | | |
|---------------------|------------|---|
| M. Le Bellac | 40' | Collective excitations in the quark-gluon plasma |
|---------------------|------------|---|

QUANTUM DOTS

| | | |
|---------------------|------------|---|
| R. Berkovits | 20' | Transport through low density quantum dots |
| P. Hawrylak | 20' | Electronic correlations in semiconductor quantum dots |
| P. Bakshi | 15' | Collective vs. single particle response of quantum dot ensembles (Bakshi, Kempa) |
| M.-E. Pistol | 15' | Optical studies of individual InAs quantum dots (Landin, Miller, Pistol, Pryor, Samuelson) |

Reception and Concert 8:00

Friday, August 8

Session 5A 9:00 J. Dufty

BILAYERS

- | | | |
|-----------------------|-----|---|
| <i>J. Nicholls</i> | 20' | Correlation effects on the coupled plasmon modes of a double quantum well |
| <i>F. Peeters</i> | 20' | Classical atomic bilayers (<i>Peeters, Partoens, Schweigert, Schweigert, Goldoni</i>) |
| <i>G. Senatore</i> | 20' | Recent progress on the phase diagram of coupled electron layers in zero magnetic field |
| <i>L. Swierkowski</i> | 20' | Coulomb drag and exciton condensate in coupled electron hole layers |
| <i>V. Valtchinov</i> | 15' | Structure and dynamics of electronic bilayer liquids (<i>Valtchinov, Kalman, Golden</i>) |

Session 5B 11:00 Yu. Kurilenkov

FUSION PLASMAS

- | | | |
|----------------------|--------|---|
| <i>C. Deutsch</i> | 40' | Hohlraum targets driven by cluster ion beams for inertial confinement fusion (<i>Deutsch, Tahir, Geb, Maruhn</i>) |
| <i>M. Stetter</i> | 15' | High density plasma physics with heavy ion beams (<i>Stetter, Bock, Dornik, Funk, Geissel, Jöckl, Roth, Spiller, Stöckl, Süß, Stöwe, Fortov, Mintsev, Kulish, Shutov, Sharkov, Golubev, Bruynetkin, Hoffmann, Tahir</i>) |
| <i>D. O. Gericke</i> | 15' | Kinetic approach to the stopping power (<i>Gericke, Schlanges, Kraeft, Bornath</i>) |
| <i>M. Stetter</i> | Poster | Improvement of the plasma lens and new heavy ion target designs (<i>Stetter, Bock, Funk, Geissel, Stöwe, de Magistris, Fortov, Mintsev, Shutov, Hoffmann, Tahir</i>) |
| <i>C. Cereceda</i> | Poster | Distribution function of charged particles in a plasma of fusion interest (<i>de Peretti, Sabatier, Cereceda</i>) |

LASER PRODUCED SEMICONDUCTOR PLASMAS

- | | | |
|------------------|-----|--|
| <i>M. Bonitz</i> | 20' | Ultrafast relaxation in strongly coupled coulomb systems (<i>Bonitz, Kremp</i>) |
|------------------|-----|--|

Session 5C 2:00 P. Bakshi

DENSE PLASMAS

| | | |
|---------------------|--------|---|
| Yu. Kurilenkov | 20' | On dense plasmas absorbing power under weak and strong coupling (Kurilenkov, Maynard, Dufty, Skowronek) |
| M. M. Popovic | 15' | On the dependence of continuum factors on plasma parameters (Popovic, Djordjevic) |
| V. Rantsev-Kartinov | 15' | Observations of charged particle dynamical screening effects and phase transition to a dense plasma in hot z-pinch plasma (Rantsev-Kartinov, Trofimovich) |
| I. Tkachenko | 15' | Electrical conductivity of strongly coupled model and real plasmas (Tkachenko, de Cordoba) |
| N. Vogel | 15' | Plasma focus experiments |
| P. D. Gasparian | Poster | Comparison of average atom and collisional-radiative kinetic model in strongly coupled plasma (Gasparian, Kotchubey, Roslov) |
| V. Rantsev-Kartinov | Poster | Self-organization phenomena in dense plasma focus experiments (Kukushkin, Rantsev-Kartinov, Terentiev, Cherepanov) |
| V. Rantsev-Kartinov | Poster | Theory of thermoelectric field in LTE plasmas (Krainov, Rantsev-Kartinov, Trofimovich) |
| I. Tkachenko | Poster | Modeling of strong discharges in water (Tkachenko, DeSilva, Iserte) |

WEAKLY COUPLED PLASMAS

| | | |
|----------------|--------|---|
| V. Belyi | 15' | The kinetic equations for non-ideal spatially inhomogeneous plasmas (Belyi, Kukhareenko, Wallenborn) |
| J. R. Jasperse | 15' | Effect of two-particle correlations on plasma waves (Jasperse, Basu) |
| A. Reynolds | Poster | Velocity-space drag and diffusion in a model two-dimensional plasma (Reynolds, Fried, Morales) |
| J. Wallenborn | Poster | Pair correlation function and non-linear kinetic equation for a spatially uniform polarizable non-ideal plasma (Belyi, Kukhareenko, Wallenborn) |

Session 5D 4:20 F. B. Balmbetov

HYDROGEN II

| | | |
|----------------|-----|---|
| N. W. Ashcroft | 40' | Symmetry breaking in dense hydrogen |
| R. Redmer | 20' | Thermodynamics and metal-nonmetal transition in dense hydrogen plasma (Bunker, Nagel, Redmer, Röpke) |
| J. Clerouin | 15' | The dense hydrogen plasma, a comparison between models (Clerouin, Bernard) |

Conference Dinner 6:30

Saturday, August 9

Session 6A 9:00 Yu. Chutov

IONIZATION AND BOUND STATES

| | | |
|------------------------|---------------|---|
| M. Schlages | 40' | Kinetic theory of ionization and recombination rates for dense quantum plasmas (Schlages, Bornath) |
| D. Kremp | 20' | Bound states in dense non-equilibrium plasmas (Kremp, Kraeft) |
| M. S. Murillo | 20' | Decay of atomic states in strongly coupled plasmas |
| A. Förster | 15' | Stochastic simulation of ionization fronts in non-ideal plasmas (Beule, Förster) |
| R. Fehr | Poster | Spectral properties in dense plasmas (Fehr, Kraeft) |
| A. Förster | Poster | Plasma of capillary discharges (Beule, Conrads, Ebeling, Förster) |
| A. Förster | Poster | Adiabatic equation of state and ionization equilibrium of dense plasma (Beule, Ebeling, Förster) |
| Y.-D. Jung | Poster | Eikonal cross section for elastic electron-ion scattering in strongly coupled plasma |
| H. Norman | Poster | Vanishing of higher excited bound states without lowering of ionization potentials in partially ionized strongly coupled plasmas (Kaklyugin, Norman) |
| R. Prenzel | Poster | Ionization kinetics in a dense carbon plasma (Prenzel, Bonath, Schlages) |
| A. N. Starostin | Poster | Non-exponential temperature dependence of reaction rates in non-ideal plasmas (Aleksandrov, Starostin) |

Session 6B 11:00 K. Golden

RESPONSE FUNCTIONS

| | | |
|---------------------|------------|--|
| H. Norman | 40' | Response functions for electron-ion strongly coupled plasmas (Norman, Valuev) |
| J. Ortner | 15' | Dynamic structure factor of quantum plasmas: theory and molecular dynamics simulations using momentum-dependent potentials (Ortner, Schautz, Ebeling) |
| M. Rommel | 15' | The quadratic response of an electron gas in one, two and three dimensions (Rommel, Genga, Kalman) |
| W. Stolzmann | 15' | Thermodynamic functions of strongly coupled plasmas: Local field effects (Stolzmann, Rösler) |

Session 6C 2:00 H. Lee

| | | |
|---------------|--------|--|
| G. Röpke | 20' | Dielectric function and transport coefficients in strongly coupled plasmas |
| G.A. Pavlov | 15' | Optical characteristics of strongly coupled Coulomb systems |
| L. G. Suttorp | 15' | Statistical properties of plasmas with quantized electrodynamical interaction |
| D. Lu | Poster | Extra loop in plasmon dispersion for strongly coupled Coulomb liquids |
| G.A. Pavlov | Poster | Effective transport coefficients in low temperature multicomponent plasma |
| I. Tkachenko | Poster | Electromagnetic modes in cold magnetized strongly coupled plasmas (Rylyuk, Tkachenko, Ortner) |

Session 6D 3:30 I. Oppenheim - Session dedicated to the memory of Eugene P. Gross**STATISTICAL PHYSICS**

| | | |
|----------------|--------|--|
| J. L. Lebowitz | 40' | Fluctuations in coulomb systems and random matrix ensembles |
| F. Cornu | 20' | Algebraic screening and van der Waals forces in partially ionized gases (Cornu, Alastuey, Martin) |
| B. Jancovici | 20' | Two-dimensional logarithmic interaction: A review |
| J.-M. Caillol | 20' | A Monte Carlo finite size study of charged hard spheres criticality (Caillol, Levesque, Weis) |
| A. Perez | 15' | Virial expansion for a classical hard sphere plasma in the low density limit |
| W. Appel | Poster | Thermal photonic screening in a weakly relativistic plasma (Appel, Alastuey) |

No Evening Event

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